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Simulation of fermionic and frustrated lattice models in two dimensions with tensor network algorithms PHILIPPE CORBOZ, Theoretische Physik, ETH Zurich, Switzerland/Institute for theoretical Physics, EPF Lausanne, Switzerland, GLEN EVENBLY, JACOB JORDAN, ROMAN ORUS, GUIFRE VIDAL, School of Mathematics and Physics, The University of Queensland, Australia, BELA BAUER, MATTHIAS TROYER, Theoretische Physik, ETH Zurich, Switzerland, FREDERIC MILA, Institute for theoretical Physics, EPF Lausanne, Switzerland, FRANK VERSTRAETE, Faculty of Physics, University of Vienna, Austria — The simulation of strongly correlated fermionic and frustrated systems in two dimensions is one of the biggest challenges in computational physics. Borrowing ideas and tools from quantum information and condensed matter physics, a new generation of simulation techniques for many-body systems, the so-called tensor network algorithms (e.g. PEPS, MERA), have been proposed in the last few years. These algorithms have been generalized to fermionic systems recently. We present a particularly simple formalism to account for the statistics of fermionic degrees of freedom in a tensor network. Benchmark results confirm the validity of this approach, and show that the computational cost of simulations does not depend a priori on the particle statistics, but on the amount of entanglement in the system.

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